# Creative music therapy in premature infants: Testing its possible influence on brain development

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# CREATIVE MUSIC THERAPY IN PREMATURE INFANTS: TESTING ITS POSSIBLE INFLUENCE ON BRAIN DEVELOPMENT

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Premature infants are a highly prevalent and vulnerable group in pediatric care, and face several short- and long-term challenges (March of Dimes, 2012). Research on brain development in premature infants demonstrates a high incidence of white and grey matter abnormalities and neurobehavioral delay, as well as an increased risk of brain injury (Huppi et al., 1996; Inder et al., 2005). There is growing awareness that premature infants need individualized nurturing interactions with their caregivers while they are in a neonatal intensive care unit (NICU) to support healthy development and prevent future difficulties (Kato et al., 2011). One particular intervention that may have considerable potential in the NICU is creative music therapy (CMT), an individualized, interactive, resource- and needs-oriented music therapy approach. Results demonstrate that CMT can facilitate relaxation and stabilization in premature infants; by experiencing inter-subjectivity through music, the infants can be empowered to engage in meaningful and nurturing interactions (Haslbeck, 2013a, b).
Several researchers (Als, 2012; Schore, 2003; Trevarthen, 2008) have described how interactive and multi-sensory experiences of the fetus particularly facilitate brain development and learning about socio-emotional figures, respectively, in prematurely born infants. It is assumed that positive auditory experiences can promote premature infants' early brain maturation and contribute to their healthy neurodevelopment (Xu et al., 2009). Studies in music and neuroscience have demonstrated that music promotes neurobiological processes and modulates synaptic plasticity, neuronal learning and readjustment in the human brain (Rickard et al., 2005). The individualized approach in active music therapy may especially activate brain structures involved in emotional, sensorimotor and cognitive processing (Fachner et al., 2012; Koelsch, 2009). Since, on one hand, individualized interactive experiences and, on the other hand, music may alter brain development in the fetus and very young infants, the question arises as to whether CMT might actually promote a premature infant's brain development by facilitating nurturing socio-emotional *and* auditory interactive experiences at the same time. Therefore a prospective, controlled, between-subject clinical trial is currently conducted. Twenty-five premature infants received CMT during their hospitalization time and a matched case control group without music therapy served as control group. The primary objective was to explore if the experience of CMT in premature infants improves their brain growth and development at 38-42 weeks of corrected GA. The main secondary objective is to explore if CMT improves the neurobehavioral outcomes of premature infants at 9 and 24 months, as well as at 5 years of age. Magnetic resonance imaging is used to evaluate the infants' cerebral cortical development and myelination. Electroencephalography (EEG) is used to evaluate the infants' brain function and maturation. Insights into possible long-term and sustainable outcomes will be gained via neuro-developmental follow-up examinations. It is hypothesized that the experience of CMT in neonatal care improves both short- and long-term neurological outcomes. We expect that the experimental group will demonstrate superior brain growth and development at 38-42 weeks of corrected GA as well as improved cognitive, behavioral and motor developmental outcomes later on. This paper will introduce first insights and preliminary results of the ongoing study. Strategies and challenges inherent in conducting a controlled clinical trial within this vulnerable group will be discussed.

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